July 24, 1962 E. W. BUCK 3,045,620

UNITARY PORTABLE ELECTROMAGNETIC CLAMP

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FIG_1

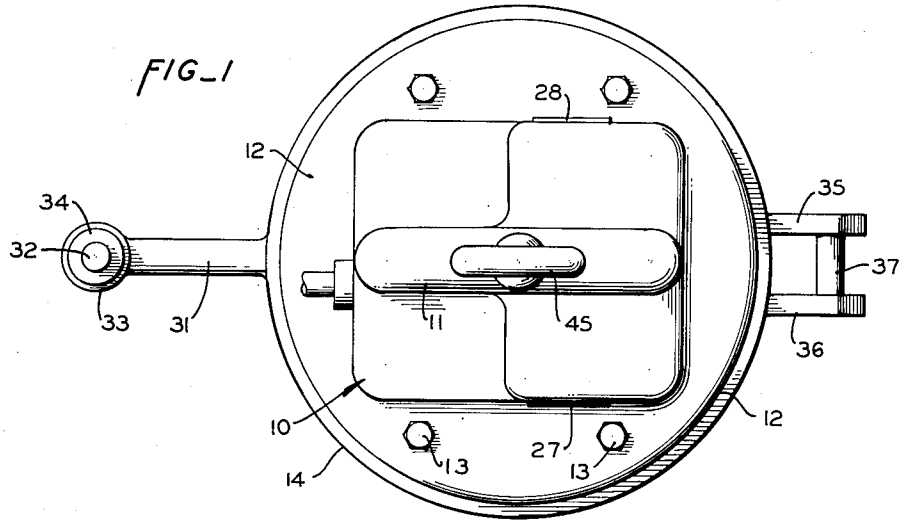
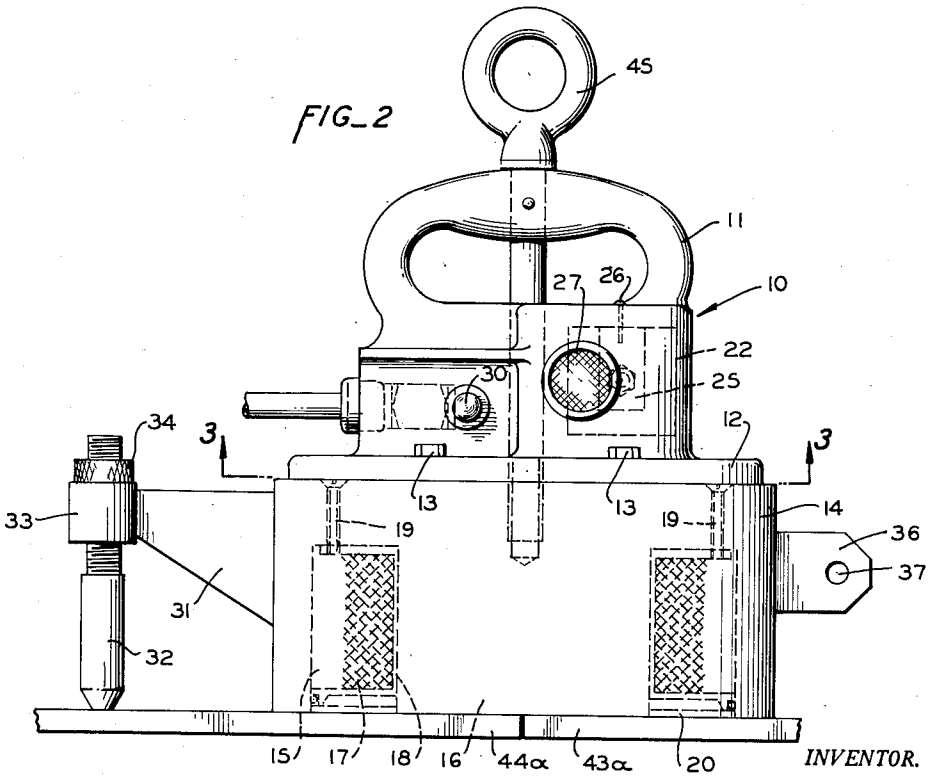


FIG_2



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FIG_3

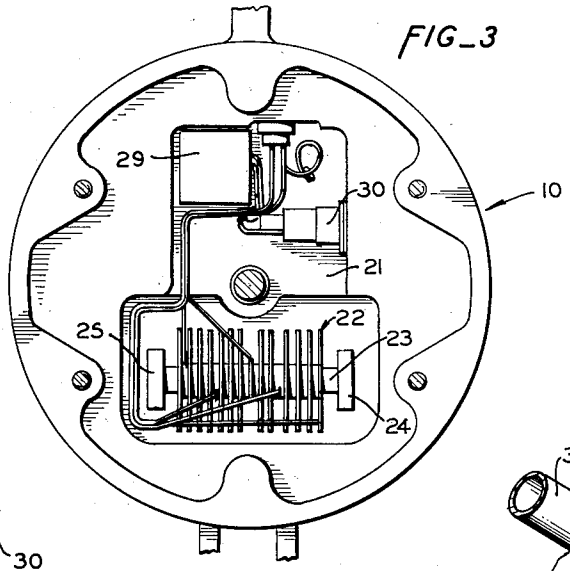


FIG_5

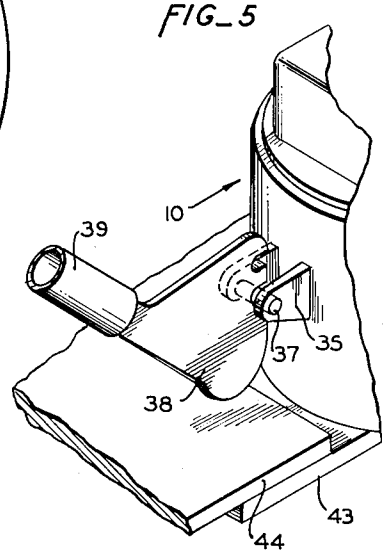


FIG_7

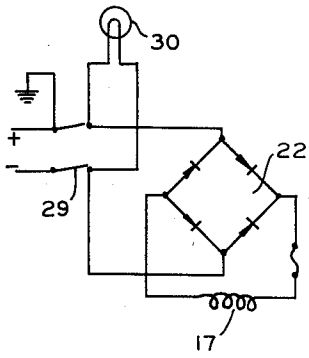
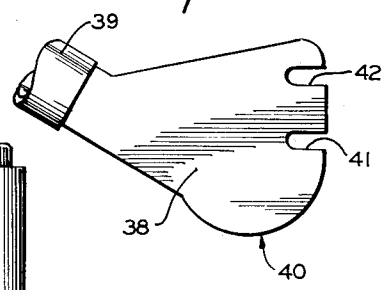


FIG_4

FIG_6



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United States Patent Office 3,045,620 Patented July 24, 1962

3,045,620 UNITARY PORTABLE ELECTROMAGNETIC CLAMP

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Filed Dec. 10, 1956, Ser. No. 627,207
2 Claims. (Cl. 113—99)

This invention relates to electromagnetic clamps in general. More particularly this invention relates to a portable electromagnetic clamping or holding device for use in holding or clamping articles together while work is performed thereon.

This application is a continuation-in-part of my co-pending application, Serial No. 519,978, filed July 5, 1955, now abandoned.

An object of this invention is to provide an improved portable electromagnetic device that is of light weight construction.

Still another object of this invention is to provide an improved portable electromagnetic device that is constructed so as to efficiently clamp together articles while work is performed thereon, said device being so shaped that it is easily and readily used by workmen and permits easy access to the working surface.

A further object of this invention is to provide an improved portable electromagnetic device for holding or clamping various articles together while they are being assembled, said device being of relatively small size constructed for producing a high intensity magnetic field so as to be able to hold together objects of substantial size.

Other and further objects of this invention will be apparent to those skilled in the art to which it relates from the following specification, claims and drawings.

In accordance with this invention, there is provided a portable electromagnetic device that is constructed and shaped so as to be highly useful in holding or clamping together various objects while work is being performed on such objects. This device is constructed so as to provide a source of high intensity magnetic field such that objects of magnetic material may be acted upon thereby and magnetically gripped in a firm and positive manner to provide the desired holding and clamping action. For this purpose this device is so shaped that it forms the minimum amount of obstruction whereby the surfaces to be worked upon are accessible to the workmen.

This device comprises an electromagnetic coil that is positioned in a housing of magnetic material that also functions as the magnetic core and is shaped so as to efficiently utilize the magnetic field set up by the coil. A rectifier is provided in a housing that is positioned immediately adjacent to the magnetic core structure so that the device has a generally low configuration and may be readily cleared by workmen that are engaged in working on surfaces which may be all around the device.

In addition, this device is provided with a bracket and an adjustable bracing post supported by said bracket. This bracing post is supported on one side of the coil housing spaced therefrom and diametrically opposite to the location of a detachable clamping member which is provided for the purpose of clamping engagement with working surfaces that may be disposed above or below the plane of the working pole face of the magnetic core.

The above and other features of this invention will be set forth in detail in the following specification and drawing in which briefly:

FIG. 1 is a plan view of an embodiment of this invention;

FIG. 2 is a view of this device in side elevation;

FIG. 3 is a view taken along the line 3—3 of FIGURE 2;

FIG. 4 is a view in rear elevation of this device;

FIG. 5 is a fragmentary view illustrating the detachable clamping device engaging the bracket on the side of the magnetic core member;

FIG. 6 is a side view of the detachable clamp; and

FIG. 7 is a schematic wiring diagram.

Referring to the drawing in detail, this apparatus is provided with a top structure that comprises the housing **10** which is preferably made of non-magnetic material and which is provided with a handle **11** and a base flange portion **12** that is attached by means of the bolts **13** to the electromagnetic base or coil housing **14** which is of magnetic material. The base **14** is provided with an annular or donut-shaped cavity **15** which surrounds the substantially centrally disposed magnetic core member **16**.

The cavity **15** extends well into the magnetic core structure from the bottom thereof so that the coil **17** which is wound on the spool or form **18** may be inserted into this cavity, also the center core member or portion **16** is made of a size so that it fits the opening through the center of the spool **18**. A plurality of screws **19** are positioned in suitable holes formed in the magnetic core and engage the top flange of the spool **18** in threaded holes formed therein for the purpose of holding said spool in the cavity **15**. A bottom plate **20** which is of non-magnetic material and which is of an annular shape may be provided for sealing the opening to the cavity **15** after the coil and spool structure are placed in said cavity.

The top structure **10** is also provided with a cavity **21** as shown in FIGURE 3. This cavity is formed with a generally rectangular part that is adapted to receive the dry disc rectifier **22** which may be of the selenium type. This rectifier is of conventional construction and is supported by means of the rod **23**, the ends of which are positioned in the blocks **24** and **25** that are made of insulating material. The blocks **24** and **25** are attached to the housing **10** by means of screws such as the screw **26** shown in FIGURE 2. Suitable openings **27** and **28** which are screened and of generally circular configuration as shown in FIGURE 2, are positioned, one at each end of the cavity in which the rectifier **22** is mounted, and these openings provide vents or ports through which air or other cooling medium may circulate in and out of the housing whereby the heat generated by the rectifier is dissipated. The rectifier **22** is connected as a full wave rectifier in accordance with the wiring diagram shown in FIGURE 7 and the output is connected to energize the electromagnetic coil **17**.

The other part of the cavity **21** is provided for the purpose of housing the switch **29**, a signal light **30** and the connections provided between these elements and the rectifier. The cord supplying the current to this device is also brought into this part of the cavity. The operating lever **29*a*** of the switch **29** and a part of the lamp **30** project out of the cavity through holes, formed in the walls thereof, in which holes these devices are fastened. Suitable overhanging wall **29*b*** serves to protect the switch lever **29*a*** from being accidentally operated. The wall **30*a*** on the other side serves to protect the lamp **30**.

A bracing bracket **31** is firmly attached to one side of the core member **14** by welding or otherwise, and this bracket extends radially outward for the purpose of receiving a threaded stud **32**. The stud **32** is positioned in a threaded hole formed in the enlarged portion **33** of the bracket **31** and a nut **34** is also provided to the threaded stud **32** for the purpose of holding this stud firmly in its adjusted position. Diametrically opposite to the bracket **31** there are provided brackets **35** and **36** which may also be attached to the core member **14** by welding. These brackets **35** and **36** support a circular rod member **37**

therebetween which is fixedly attached thereto and is provided for the purpose of engaging the adjustable clamp member 38 as shown in FIGURE 5. This clamp member is provided with an elongated handle 39 and an arcuate cam surface 40, together with a pair of recesses 41 and 42. These recesses are each of sufficient width to receive the rod member 37 during the clamping operation.

The clamping member 38 is employed in connection with this electromagnetic device when it is desired to hold two overlapping members 43 and 44 as shown in FIGURE 5. These members 43 and 44 are of magnetic material and the magnetic field set up by the coil 17 of this device magnetically grips the device to the plate 43. The plate 44 is placed down upon the plate 43 so that these plates overlap the desired distance, and then the clamping device 38 is positioned with one of the recesses 41 or 42 thereof engaging the rod 37 and the cam surface 40 engaging the plate 44. The operator then bears down upon the handle 39 and causes the cam surface 40 of the member to clamp down upon the plate 44, thereby holding this plate in position on the plate 43 until the two plates are welded or otherwise attached together. Where it is desired to weld together plates that abut as in the case of plates 43*a* and 44*a*, such plates may be held together by causing this electromagnetic device to straddle said plates, as shown in FIGURE 2, thereby magnetically gripping both of said plates.

This device may also be employed for lifting magnetic materials while they are worked on or for moving them from place to place and an eye bolt 45 that is threaded into the central part of the core member 14 is provided for the purpose of lifting this device and the load of magnetic material gripped thereby. This eye bolt extends through a hole formed in the handle 11 and in the housing 10, and this eye bolt may be attached to a suitable crane or other lifting apparatus.

While I have shown a preferred embodiment of the invention it will be understood that the invention is capable of variation and modification from the form shown so that its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. A unitary portable electromagnetic device for use in holding or clamping articles such as metal plates while work is performed thereon, comprising an electromagnetic base having a centrally disposed core member and an annular cavity therein disposed around said core member, a coil positioned in said annular cavity and surrounding said core member, a housing having a generally flat configuration, said housing having a flange on one side thereof, means for attaching said flange to said electromagnetic base, a rectifier for rectifying alternating current to provide direct current to said coil, said housing having an elongated cavity therein for receiving said rectifier, a pair of blocks of insulation material, means for attaching said blocks to said rectifier, means for holding said blocks in the end portions of said elongated cavity, said elongated cavity having ventilating apertures near the ends of said rectifier through which air for cooling said rectifier is adapted to flow in and out of said elongated cavity, and an electric switch connected to control the energization of said rectifier.

2. A unitary portable electromagnetic device for use in holding or clamping articles such as metal plates while work is performed thereon, comprising an electromagnetic base having a centrally disposed core member and an annular cavity therein disposed around said core member, a coil positioned in said annular cavity and surrounding said core member, a housing having a flange, means for attaching said flange to said electromagnetic base, a rectifier for rectifying alternating current to provide direct current to said coil, said housing having an elongated cavity therein for receiving said rectifier, a pair of blocks of insulation material, means for attaching said blocks to said rectifier, means for holding said blocks in the end portions of said elongated cavity, said elongated cavity having ventilating apertures in the end walls thereof through which air for cooling said rectifier is adapted to flow in and out of said elongated cavity, an electric switch connected to control the energization of said rectifier, said housing having an aperture for receiving and supporting said switch, a wall member on said housing overhanging the operating lever of said switch and for protecting said lever from accidental operation, and an eye bolt extending through said housing and into said centrally disposed core member from which the device is adapted to be supported.

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